

## PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

## Apparatus for Mixing and Storing Temporarily a Liquid and a Gas

We, W. MEADOWCROFT & SON, LIMITED, of Regent Street, Blackburn, in the County of Lancaster, a British Company, and William Meadowcroft, of the Company's address, a British subject, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus for mixing and storing temporarily a liquid and a gas such for example as a carbonator, for mixing and storing beer and a gas such as carbonic acid gas and it comprises a gas cylinder situated within a tank for the storage of a mixture of the liquid and gas, the supply of gas to the gas cylinder passing by way of a pressure reducing valve that is opened or closed by variation in pressure in the cylinder, the supply of water to the mixing and storage tank being delivered by a pump to an injector mixing device to which gas from the cylinder is admitted through a pressure reducing valve, the mixture of gas and liquid passing to the tank for the storage of liquid and gas, a float actuated by a rise in the liquid in such tank allowing liquid to be forced therefrom to actuate automatic knock off mechanism to stop the pump, reduction in pressure on the delivery side of the pressure reducing valve that is controlled by variation in pressure in the gas cylinder automatically opening such valve to admit more gas to such gas cylinder. The object of the arrangement described is to utilize the low temperature of the gas which is put into the cylinder through the pressure reducing valve and is therefore very cool to partially cool the liquid in the tank thus enabling it to absorb slightly more gas than it otherwise would.

In order that the said invention may be clearly understood and readily carried into effect, the same is described more fully with reference to the accompanying drawing which is a sectional elevation of a carbonator for mixing and storing beer and carbonic acid gas.

A indicates the mixture storage tank, B the gas cylinder and C a pressure reducing valve.

In the example shown the tank A is [Price 1/-]

fitted at the top with a cover *a* provided with a tank D and a pump E. Water is supplied to the tank D through a pipe *d* fitted with a ball float valve *d'* and is drawn off through a passage *e*, inlet valve *e'* into the pump E and through a delivery valve *e''* into an injector mixing device F, through a sighting indicator *f*, and a pipe *f'* to an annular pipe *f''* which surrounds the cylinder B and is formed with a number of spraying apertures. Gas is supplied to the gas storage cylinder B through a pipe G fitted with an inlet valve *g* and through an automatic reducing valve *G'* and passage *g'* to the cylinder B. The reducing valve *G'* is controlled by the pressure in the cylinder B. For this purpose it is operated by a lever *g''* connected to a rod *g'''* that passes down a tube *g''''* which extends to within a short distance from the bottom of the cylinder B. Fixed on the bottom of the rod is a piston *g'''''* that fits the tube *g''''* and maintained in a state of compression between the piston *g'''''* and the cover *a*, or an abutment in the tube *g''''* is a spring *g''''''* that encircles the rod *g'''*. The cylinder B is provided with a pressure gauge *b*, safety valve *b'* and a stop valve *b''* for controlling the passage of gas to the pressure reducing valve C. Leading from the latter is a pipe *c* fitted with a pressure gauge *a'* for indicating the pressure in the mixture storage tank A. The pipe *c* is fitted with a branch pipe *c'* leading to the injector mixing device F and is continued into the tank A. Situated in the mixture storage tank A is a float H that is operatively connected with one arm of a bell crank lever *h* that actuates two coupled valves *h'*, *h''* against the action of a spring *h'''*. These valves control the flow of liquid through two pipes *h''''*, *h'''''*, the pipe *h'''''* being connected with the tank D and the pipe *h''''* constituting the feed and return pipe for an automatic knock off cylinder (not shown). This cylinder contains a spring actuated piston that is connected with a mechanical or electrical device for disconnecting the drive to the pump. The bottom of the tank A is fitted with a pipe *a''* and draw off valve *a'''* for controlling the supply of aerated water to any filling machine and with a drain pipe *a''''* fitted with a valve *a'''''*. The tank A is fitted

with an air extractor valve  $a^6$  and the water tank D is fitted with a drain cock  $d^2$  and an overflow  $d^3$ .

To start the apparatus, the gas supply is turned on and gas enters the cylinder B past the valve  $G^1$  which is kept open by the spring  $g^6$ . When the pressure of gas in the cylinder B arrives at a pre-determined value, say for example from 160 to 200 pounds per square inch, the pressure forces the piston  $g^5$  and rod  $g^7$  against the action of the spring  $g^6$  to close the reducing valve  $G^1$ . The stop valve  $b^2$  is now opened and the pump E set in motion. Gas and liquid are now mixed in the injector mixing device F and sprayed into the tank A. This continues until the liquid in the tank A rises sufficiently to cause the float H to turn the bell crank lever  $h$  away from the valve  $h^1$  whereupon the spring  $h^3$  opens the valve  $h^1$  and closes the valve  $h^2$ . Gas pressure in the tank A then forces liquid through the pipe  $h^4$  to actuate the automatic knock off mechanism to disconnect the pump drive and so stop the pump. When the liquid level in the tank A falls, the float actuated bell crank lever  $h$  closes the valve  $h^1$  and opens the valve  $h^2$ . The spring actuated piston in the knock off cylinder then forces the liquid in the pipe  $h^4$  past the valve  $h^2$  along the pipe  $h^5$  back into the tank D for re-use. When the pressure on the delivery side of the valve  $G^1$  is reduced the latter is automatically opened to admit more gas to the cylinder B. It will thus be seen that after the apparatus has been started it continues to work automatically under the control of the pressure in the cylinder B and liquid level in the tank A.

We are aware that in dispensing apparatus it has previously been proposed to employ a refrigerant chamber containing solid carbon dioxide as a refrigerant and situated and communicating with a beverage dispensing chamber so that gas evolved from said refrigerant causes flow of beverage from the supply container to the dispensing chamber. It has also been proposed in dispensing apparatus to employ a liquid containing receptacle within which is situated a gas container the object being to provide means whereby the said liquid irrespective of the amount in the receptacle shall always remain under a constant or substantially constant pressure. It has been proposed to con-

struct a syphon with a gas reservoir containing gas under pressure situated within the syphon and provided with means whereby on each withdrawal of liquid content from the syphon the gas pressure on the liquid is replenished from the gas reservoir. It has been proposed to connect a liquid containing receptacle with a vessel containing carbonic acid gas by a pipe and utilising the pressure of the acid to blow the liquid out of the receptacle into a bottle. It has been proposed to provide a beer jug with a sealed cover from which depends a carbonic acid container that dips into the jug and is capable of being put into communication with the interior thereof through a reducing valve by means of which the pressure existing in the jug can be exactly regulated and to such constructions we make no claim.

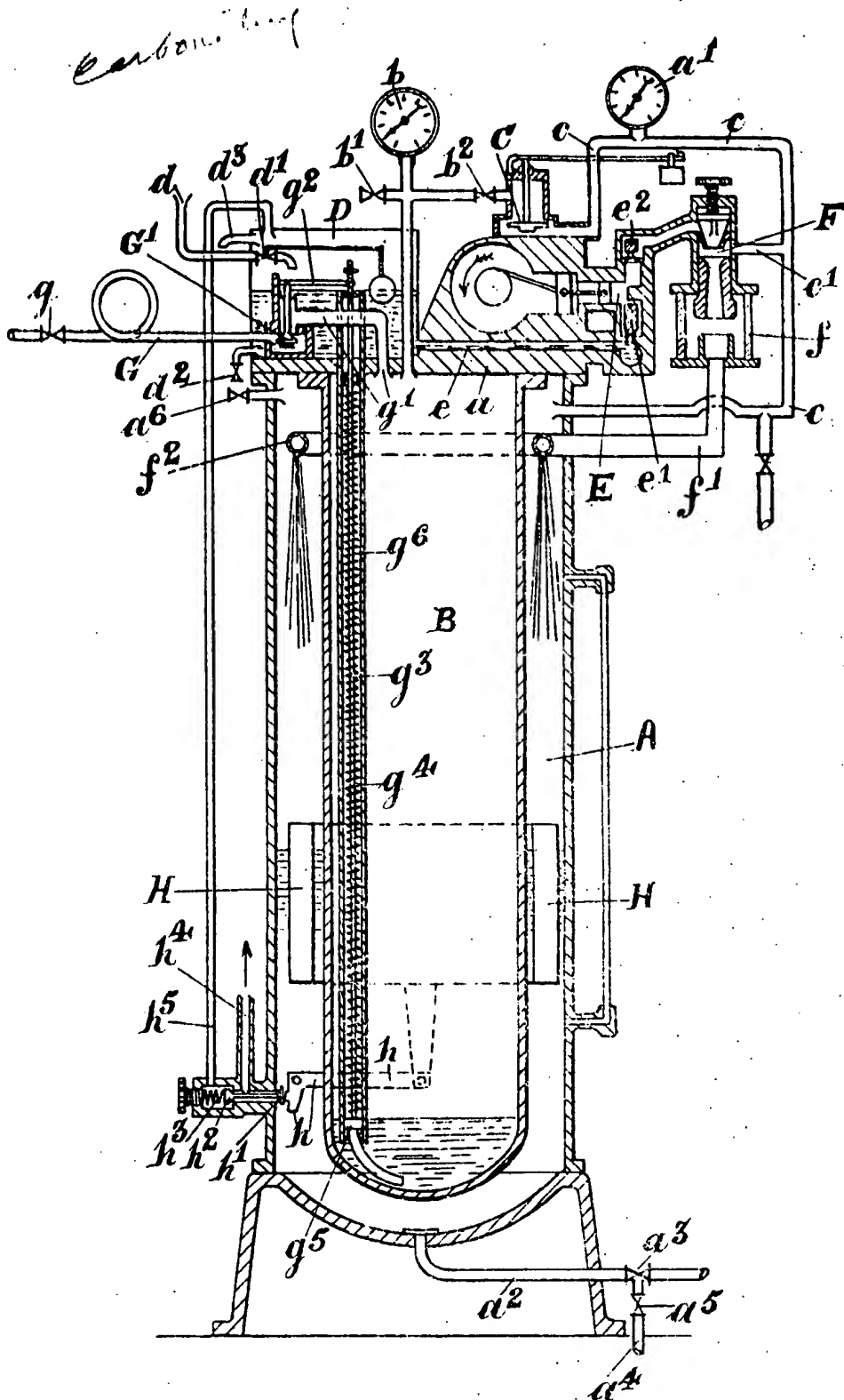
Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Apparatus for mixing and storing temporarily a liquid and a gas comprising a gas cylinder situated within a tank for the storage of a mixture of the liquid and gas, the supply of gas to the gas cylinder passing by way of a pressure reducing valve that is opened or closed by variation in pressure in the gas cylinder, the supply of water to the mixing and storage tank being delivered by a pump to an injector mixing device to which gas from the cylinder is admitted through a pressure reducing valve, the mixture of gas and liquid passing to the tank for the storage of liquid and gas, a float actuated by a rise in the liquid level in such tank allowing liquid to be forced therefrom to actuate automatic knock off mechanism to stop the pump, reduction in pressure on the delivery side of the pressure reducing valve that is controlled by variation in pressure in the gas cylinder automatically opening such valve to admit more gas to such cylinder.

2. Apparatus for mixing and storing temporarily a liquid and a gas substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 14th day of October, 1937.

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Agents for the Applicants.



[This Drawing is a reproduction of the Original on a reduced scale.]